UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,390	01/05/2004	Johannes Kaeppeler	03345-P0046A	2672

24126 7590 06/30/2009

ST. ONGE STEWARD JOHNSTON & REENS, LLC
986 BEDFORD STREET
STAMFORD, CT 06905-5619

EXAMINER	
MACARTHUR, SYLVIA	
ART UNIT	PAPER NUMBER
1792	
MAIL DATE	DELIVERY MODE
06/30/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOHANNES KAEPPELER

Appeal 2009-002355
Application 10/751.390
Technology Center 1700

Decided: [1] June 30, 2009

Before CHARLES F. WARREN, CATHERINE Q. TIMM, and JEFFREY T. SMITH, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicant appeals to the Board from the decision of the Primary Examiner finally rejecting claims 1 and 3 through 19 in the Office Action

---

[1] The two month time period for filing an appeal or commencing a civil action specified in 37 C.F.R. § 1.304, begins to run from the Decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

mailed October 1, 2007. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 41.31(a) (2007).

We affirm the decision of the Primary Examiner.

Claim 1 illustrates Appellant's invention of a device for depositing crystalline layers on a crystalline substrate, and is representative of the claims on appeal:

1. A device for depositing in particular crystalline layers on an in particular crystalline substrate, having:

a high-frequency-heated substrate holder heated by electrical conduction and made from conductive material holding a substrate with surface-to-surface contact,

said substrate holder having a first zone and a second zone, said first zone formed of a material having a higher electrical conductivity than the second zone, the first zone having a surface temperature (t_1) and the second zone having a surface temperature (t_2) when the substrate holder is heated by electrical conduction, where t_1 is greater than t_2,

characterized in that the first zone of higher electrical conductivity substantially corresponds to an area of the supported surface of the substrate.

The Examiner relies upon the evidence in these references (Ans.[2] 3):[3]

Burk	US 5,788,777	Aug. 4, 1998
Rupp (Rupp '324)	US 2001/0052324 A1	Dec. 20, 2001
Rupp (Rupp '167)	US 6,740,167 B1	May 25, 2004

Appellant requests review of the following grounds of rejection advanced on appeal by the Examiner (App. Br. 5-6):

---

[2] We consider these documents: Appeal Brief filed October 31, 2007; Examiner's Answer mailed January 22, 2008; and Reply Brief filed February 22, 2008.

[3] The Examiner also relies on the "Electrical Conductivity of the Elements Table" (www.standnes.no/chemix/periodictable/electrical-conductivity-elements.htm) to show fact (Ans. 3 and 4). We do not find a discussion of this reference necessary to our decision.

claims 1, 3, 8, 10, 11, 14, and 17 through 19 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Rupp '324 (Ans. 3);

claims 9 and 12 under 35 U.S.C. § 103(a) as unpatentable over Rupp '324 (Ans. 6);

claims 1, 3, 8, 10, 11, and 14 through 19 under 35 U.S.C. § 103(a) as unpatentable over Rupp '167 in view of Burk (Ans. 7[4]); and

claims 4 through 7 and 13 under 35 U.S.C. § 103(a) as unpatentable over Burk in view of Rupp '167 or Rupp '324 (Ans. 9).

Appellant argues the ground of rejection under § 102(b) based on independent claims 1, 14, 18, and 19 as a group, relying on essentially same arguments for these claims. App. Br. 7 and 9. Appellant argues the grounds of rejection under § 103(a) generally based on claim 1. App. Br. 8-11. Thus, we decide this appeal based on claims 1, 4, 9, and 18 as representative of the grounds of rejection. 37 C.F.R. § 41.37(c)(1)(vii) (2007).

Issues

The issues in this appeal are whether Appellant has shown that the evidence in Rupp '324 does not support the Examiner's finding of prima facie anticipation with respect to the device encompassed by claims 1 and 18, and conclusion of prima facie obviousness with respect to the device encompassed by claims 1, 9, and 18; [5] whether Appellant has shown that that the evidence in the combined teachings of Rupp '167 and Burk does not support the Examiner's conclusion of prima facie obviousness with respect

---

[4] The Examiner restated the claims subject to this ground of rejection in the Communication mailed July 28, 2008, pursuant to the Order returning Undocketed Appeal To Examiner entered by the Board on July 16, 2008.

[5] Alternative grounds of rejection under §§ 102 and 103(a) require separate consideration under each statutory provision. *See, e.g., In re Spada*,

to the device encompassed by claim 1; and whether Appellant has shown that that the evidence in the combined teachings of Burk, Rupp '167 and Rupp '324 does not support the Examiner's conclusion of prima facie obviousness with respect to the device encompassed by claim 4.

Claim Interpretation

The issue entails the interpretation of claims 1, 4, 9, and 18 by giving the terms thereof the broadest reasonable interpretation in their ordinary usage in context as they would be understood by one of ordinary skill in the art in light of the written description in the Specification unless another meaning is intended by Appellant as established therein, and without reading into the claims any disclosed limitation or particular embodiment. *See*, *e.g.*, *In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007); *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004), and cases cited therein; *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997).

We determine claim 1 specifies, as illustrated by the embodiments depicted in Specification Figures 2-4 pointed out by Appellant (App. Br. 3), a device, capable of depositing at least any crystalline layers on any crystalline substrate, having at least a substrate holder capable of being heated by electrical conduction by high-frequency coil 5. The substrate holder has first zone 3 of any material having a higher electrical conductivity than the material of second zone 2 such that the surface temperature t_1 of first zone 3 is greater to any extent than the the surface temperature t_2 of second zone 2, and the area of first zone 3 substantially, that is, largely but not wholly, corresponds to any area of any supported substrate. Spec. ¶¶

---

911 F.2d 705, 707 n.3 (Fed. Cir. 1990).

00015-00019. *See, e.g., York Prods., Inc. v. Central Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1572-73, (Fed. Cir. 1996) ("In this case, the patent discloses no novel uses of claim words. Ordinarily, therefore, 'substantially' means 'considerable in . . . extent,' *American Heritage Dictionary Second College Edition* 1213 (2d ed. 1982), or 'largely but not wholly that which is specified,' *Webster's Ninth New Collegiate Dictionary* 1176 (9th ed. 1983)."). While the substrate holder must be capable of being heated by electrical conduction by high-frequency coil, there is no requirement that the material of second zone 2 must be heated in this manner Thus, second zone 2 can be heated by radiation from the material of first zone 3 which heated by electrical conduction.

Claim 4, dependent on claim 1, specifies the substrate holder has one or more substrate-bearing disks 4, which disks can consist, in whole or in part, of first zone 3 material. Spec. ¶¶ 00017-00019 and Figs. 2-4. Claim 9, dependent on claim 1, specifies "the substrate holder is surrounded by an HF coil," which does not specify the manner in which the substrate holder is "surrounded" by the HF coil. Spec. ¶¶ 00020-00021 and Figs. 5-6.

Independent claim 18, in pertinent part, as illustrated by the embodiments depicted in Specification Figure 3, specifies a similar device to that encompassed by claim 1 as comprising at least a substrate holder having similar first and second zones, wherein t_1 is greater to any extent than t_2, and further requires that first zone 3 directly contacts substrate 1 and transfers to substrate 1 an increased amount of energy compared to second zone 2. *See* Spec. ¶¶ 00018 and 00015-00016.

The transitional term "comprising" opens claim 18 to encompass a device which contains any manner of additional structural components. *See, e.g., KCJ Corp. v. Kinetic Concepts Inc.*, 223 F.3d 1351, 1356 (Fed. Cir. 2000); *Vehicular Techs. Corp. v. Titan Wheel Int'l, Inc.*, 212 F.3d 1377, 1383 (Fed. Cir. 2000); *In re Baxter*, 656 F.2d 679, 686 (CCPA 1981). With respect to claims 1, 4, and 9, we interpret the transitional term "having" to have its ordinary meaning of opening the claims to include device which contains any manner of additional structural components because we find no basis in the claim language or in the written description in the Specification to interpret the term "having" in a limiting manner. *Compare University of California v. Eli Lilly and Co.,* 119 F.3d 1559, 1573, 43 USPQ2d 1398, 1409-10 (Fed. Cir. 1997)(in a claim encompassing a "cDNA having" an unspecified sequence, "[t]he word 'having' still permitted inclusion of other moieties.") *with In re Deuel*, 51 F.3d 1552,1555,1558, 34 USPQ2d 1210, 1212, 1215 (claims 5 and 7 to a "cDNA . . . having the " recited sequence defined "the precise cDNA molecules").

Findings of Fact

We find Rupp '324 would have evinced it was known in the art that in silicon carbide (SiC) epitaxy processes conducted on SiC substrates at high temperatures, it was known to use in the hot areas of the reactor such materials as graphite, molybdenum, tungsten, tantalum, and niobium. Rupp '324 ¶¶ 0003-0005.

We find Rupp '324 would have disclosed to one of ordinary skill in this art, as illustrated by embodiments depicted in Figures 1 and 2, a device for producing and processing SiC substrates at high temperatures,

comprising susceptor 1 that is covered by cover plate 5 having cutout area 6 such that semiconductor substrate 2 can rest on susceptor 1. Rupp '324, e.g., ¶¶ 0030-0040; *see also* ¶¶ 0010-0022 and 0045-0046. The material of the susceptor can be graphite, molybdenum, tungsten, tantalum, and niobium, and the material of cover plate 5 can be SiC, molybdenum carbide, tungsten carbide, tantalum carbide, and niobium carbide. Rupp '324, e.g., ¶¶ 0019, 0034, and 0036.

Rupp '324 discloses that in Figure 1, "susceptor 1 is preferably arranged in a non-illustrated tube" and "inductively heated . . . [by] a coil 4 . . . which surrounds the tube and is supplied with a HF voltage." Rupp '324 ¶ 0033. In Rupp '324 Figure 2, in a vertical reactor, "susceptor 1 is inductively heated by a flat coil 4." Rupp '324 ¶ 0039-0040.

Rupp '324 discloses the embodiments provide "good thermal contact between the semiconductor substrate and the susceptor" such that the substrate "is not simply heated indirectly via an SiC covering or an intermediate layer." Rupp '324 ¶¶ 0018 and 0022. "[T]he heat is transferred from . . . the susceptor[] to the SiC covering and the SiC substrate by radiation with substantially the same thermal coupling. This makes the temperature distribution on the substrate and its immediate vicinity more homogeneous." Rupp '324 ¶ 0022.

Rupp '324 discloses:

> To make the distribution of heat on the substrate as homogeneous and uniform as possible, it is necessary for the temperature to be as identical as possible throughout, even in the area surrounding the substrate. In other words, the temperature on the freely accessible surface of the substrate must be the same as on the surface of the covering 5.

> Therefore, the covering 5 is preferably arranged directly on the susceptor 1, so that there is good conductance of heat between susceptor 1 and covering 5. . . . The thermal coupling between the susceptor 1 and the covering 5 means that the covering 5 reaches substantially the same temperature as the substrate 2.
> . . . .

Rupp '324 ¶ 0044.

We find Rupp '167 would have evinced it was known in the art that in SiC epitaxy processes conducted on SiC substrates at high temperatures, it was known to use transition materials such as molybdenum and tantalum as susceptors. Rupp '167 col. 1, l. 16 to col. 2, l. 10.

We find Rupp '167 would have disclosed to one of ordinary skill in this art, as illustrated by embodiments depicted in Figure 1, a device for mounting a substrate for production of an epitaxial layer wherein susceptor 1 is separated from substrate 3 by insert 2. Rupp '167 col. 4, l. 43 to col. 5, l. 16; *see also*, e.g., col. 2, l. 33 to col. 4, l. 18. Rupp '167 discloses susceptor 1 can be graphite or transition metals such as tantalum, molybdenum, and tungsten. Rupp '167, e.g., col. 4, ll. 46-49, and col. 6, ll. 16-19. Rupp '167 discloses insert 2 is a temperature stable carbide such as tantalum carbide, molybdenum carbide, niobium carbide, and tungsten carbide. Rupp '167 col. 5, ll. 3-16; *see also*, e.g., col. 2, l. 49 to col. 3, l. 20.

We notice one of ordinary skill in this art would recognize that the susceptor metals and the metal carbides of Rupp '324 and of Rupp '167 would have different electrical conductivities.

We find Burk would have disclosed to one of ordinary skill in this art, as illustrated by embodiments depicted in Figure 1, epitaxial growth reactor 10 having susceptor assembly 20, wherein susceptor assembly 20 has a

plurality of cavities 21 each of which accommodate a wafer holder 22, and an RF heating coil arrangement 28 is deposed below susceptor assembly 20. Burk, abstract and col. 2, ll. 30-42. Burk discloses a source gas is supplied "to gas passageways within the susceptor assembly 20 to cause rotation of the individual wafer holders 22." Burk col. 2, ll. 59-64; *see also*, e.g., abstract, col. 3, l. 66 to col. 4, l. 25, col. 4, l. 65 to col. 5, l. 3, and Figs. 4, 5, and 7.

Discussion

We considered the totality of the record in light of Appellant's arguments with respect to claims 1, 4, 9, and 18 and the grounds of rejection advanced on Appeal. *See, e.g., In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998); *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992) ("After evidence or argument is submitted by the applicant in response, patentability is determined on the totality of the record, by a preponderance of evidence with due consideration to persuasiveness of argument.") (citing, inter alia, *Spada*, 911 F.2d at 707 n.3).

Claims 1 and 18: Rupp '324 - §§ 102(b) and 103(a)

We are of the opinion Appellant has not established that the evidence in Rupp '324 does not support the Examiner's finding of prima facie anticipation and conclusion of prima facie obviousness with respect to the claimed device encompassed by claims 1 and 18. We find no language in

claims 1 and 18 which supports Appellant's argument that both zones of a substrate holder must underlie a substrate in order to hold the substrate. Reply Br. 2-3. Indeed, second zone 2 of the illustrative substrate holder embodiment depicted in Specification Figure 3, which falls within both claims, does not hold substrate 1. *See* Spec. ¶ 00016 ; *see also above* pp. 4-6. To the extent that the language of claims 1 and 18 requires that the substrate must be held, the substrate holder of Rupp '324 holds the substrate with the surfaces of susceptor 1 and cover plate 5, wherein susceptor 1 directly contacts substrate 2 as claim 18 requires and claim 1 encompasses. *See above* pp. 5-6 and 7.

We further disagree with Appellant's position that the substrate holder of Rupp '324 does not exhibit two different temperature zones as required by claims 1 and 18. App. Br. 7-9; Reply Br. 2-4. We find one of ordinary skill in this art would recognize that the HF coil in the device of Rupp '324 conductively heats susceptor 1 which radiates heat to cover plate 5. *See above* pp. 7-8. Thus, Rupp '324 discloses that the difference in heat between the surfaces of susceptor 1 and cover plate 5 is not quite homogenous which is all that is required by the language "t_1 is greater than t_2" of claims 1 and 18 and the further requirement of claim 18 that first zone 3 directly contacts substrate 1 and transfers to substrate 1 an increased amount of energy compared to second zone 2. *See above* pp. 4-6 and 7-8.

Thus, on this record, the Examiner has established, as a matter of fact, that Rupp '324 describes to one skilled in this art each and every limitation of the claimed invention encompassed by claims 1 and 18, arranged as required therein, either explicitly or inherently, within the meaning of

35 U.S.C. § 102(b). *See, e.g.*, *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997), and cases cited therein; *In re Bond,* 910 F.2d 831, 832-33 (Fed. Cir. 1990), and cases cited therein. With respect to the ground of rejection of these claims under § 103(a), it is well settled that "anticipation is the ultimate of obviousness." *See In re Baxter Travenol Labs.*, 952 F.2d 388, 391 (Fed Cir. 1991), citing *In re Fracalossi*, 681 F.2d 792, 794 (CCPA 1982).

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of anticipation and of obviousness found in Rupp '324 with Appellant's countervailing evidence of and argument for non-anticipation and nonobviousness, and based thereon we conclude, by a preponderance of the evidence and weight of argument, that the claimed invention encompassed by appealed claims 1, 3, 8, 10, 11, 14, and 17 through 19 would have been anticipated as a matter of fact under 35 U.S.C. § 102(b), and would have been obvious as a matter of law under 35 U.S.C. § 103(a).

Claim 9: Rupp '324

We are of the opinion Appellant has not established that the evidence in Rupp '324 does not support the Examiner's conclusion of prima facie obviousness with respect to the claimed device encompassed by claim 9. Rupp '324 describes an embodiment of a tube reactor partially depicted in Figure 1 wherein a substrate holder as claimed in claim 1 is surrounded by an HF coil. *See above* p. 7. We are not convinced Appellant's arguments patentably distinguish claim 9 over Rupp '324 for the reasons we discussed above with respect to claim 1. App. Br. 8-9; Reply Br. 3-4. Indeed,

"anticipation is the ultimate of obviousness." *See Baxter Travenol Labs.*, 952 F.2d at 391, citing *Fracalossi*, 681 F.2d at 794.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in Rupp '324 with Appellant's countervailing evidence of and argument for nonobviousness and conclude, by a preponderance of the evidence and weight of argument, that the claimed invention encompassed by appealed claims 9 and 12 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

Claim 1: Rupp '167 and Burk

We are of the opinion Appellant has not established that the evidence in the combined teachings of Rupp '167 and Burk does not support the Examiner's conclusion of prima facie obviousness with respect to the claimed device encompassed by claim 1. We disagree with Appellant's arguments that there is language in claim 1 which requires that first zone 3 must contact a substrate. App. Br. 10. We find no such language, and indeed, in illustrative embodiments depicted in Specification Figs. 2 and 4 there is no contact between first zone 3 and the substrate. *See above* pp. 4-5; *see* Spec. ¶¶ 00017 and 00019. We also determined that the language of claim 1 specifies that the area of first zone 3 substantially, that is, largely but not wholly, corresponds to any area of any supported substrate, which does not limit the area of the substrate to that of first zone 3 or vice versa. *See above* pp. 4-5. In this respect, we find no language in claim 1 or in the Specification which permits a device to be encompassed by claim 1 based solely on the size of the substrate on which it performs work

at any one time. Thus, to the extent Appellant's position intends a method or intended use concept, it is unpersuasive. App. Br. 9-10; Reply Br. 4-5. *See, e.g., In re Yanish*, 477 F.2d 958, 959 (CCPA 1973); *In re Casey*, 370 F.2d 576, 579-80 (CCPA 1967); *In re Otto*, 312 F.2d 937, 939-40 (CCPA 1963).

In any event, Rupp '167 does not disclose a numerical or spatial limitation on the relative size of susceptor 1, insert 2, or substrate 3. We determine one of ordinary skill in this art would have reasonably selected an appropriate size for susceptor 1 and insert 2 of the device of Rupp '167 based on the size of substrate 3.

Furthermore, in the device of Rupp '167, the metal of susceptor 1 and the metal carbide of insert 2 would provide two different temperature zones and thus, two different heated surfaces, when used in a reactor, such as disclosed by Burk, that contains an RF heating coil, even if susceptor 1 heats insert 2 by radiation. *See above* p. 8. Contrary to Appellant's arguments, one of ordinary skill in this art would recognize from the teachings of Rupp '167 that the device for mounting a substrate is used for the production of epitaxial layers on a substrate, and thus can be used in an epitaxial growth reactor such as that disclosed by Burk. App. Br. 10-11; *see above* pp. 8.

Accordingly, we determine one of ordinary skill in this art routinely following the combined teachings of Rupp '167 and Burk would have reasonably arrived at the claimed device encompassed by claim 1, including all of the limitations thereof arranged as required therein, without recourse to Appellant's Specification. *See, e.g., KSR Int'l Co. v. Teleflex Inc.*,

550 U.S. 398, 420-421 (2007) (a patent claiming a combination of elements known in the prior art is obvious if the improvement is no more than the predictable use of the prior art elements according to their established functions); *In re Sovish*, 769 F.2d 738, 743 (Fed. Cir. 1985) (skill is presumed on the part of one of ordinary skill in the art); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) ("The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference . . . . Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art."); *see also In re O'Farrell*, 853 F.2d 894, 903-04 (Fed. Cir. 1988) ("For obviousness under § 103, all that is required is a reasonable expectation of success." (citations omitted)).

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in the combined teachings of Rupp '167 and Burk with Appellant's countervailing evidence of and argument for nonobviousness and conclude, by a preponderance of the evidence and weight of argument, that the claimed invention encompassed by appealed claims 1, 3, 8, 10, 11, and 14 through 19 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

Claim 4: Burk, Rupp '167 and Rupp '324

We are of the opinion Appellant has not established that that the evidence in the combined teachings of Burk, Rupp '167 and Rupp '324 does not support the Examiner's conclusion of prima facie obviousness with respect to the claimed device encompassed by claim 4. We find no specific

argument directed to this ground of rejection, and, indeed, Appellant does not address the combination of Burk and Rupp '324. App. Br. 8-11; Reply Br. 4.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in the combined teachings of Burk, Rupp '167, and Burk '324 with Appellant's countervailing evidence of and argument for nonobviousness and conclude, by a preponderance of the evidence and weight of argument, that the claimed invention encompassed by appealed claims 4 through 7 and 13 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The Primary Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

PL Initial:
sld

ST. ONGE STEWART JOHNSTON & REENS, LLC
986 BEDFORD STREET
STAMFORD, CT 06905-5619